

What is claimed is:

1 1. A digital recording apparatus that obtains a digital  
2 stream including a plurality of frames, while recording the  
3 digital stream on a digital recording medium, the digital  
4 recording apparatus comprising:

5 obtaining means for obtaining, during a recording, an  
6 instruction to perform a predetermined procedure in which a  
7 recording area for the recording has to be changed from a first  
8 recording area to a second recording area which is not  
9 necessarily continuous to the first recording area; and

10 execution control means for, in case that the obtaining  
11 means obtains the instruction and when the number of frames  
12 which are recorded in the first recording area is a  
13 predetermined number or more,

14 (1) executing the predetermined procedure, and

15 (2) allowing the recording area to be changed from the  
16 first recording area to the second recording area  
17 after the execution of the procedure.

1 2. The digital recording apparatus of Claim 1,  
2 wherein the execution control means includes:  
3 execution permitting means for, when the obtaining means  
4 obtains the instruction,

5 (1) immediately permitting the execution of the  
6 predetermined procedure, in case that the number of  
7 the frames which are recorded in the first recording  
8 area is the predetermined number or more, and

(2) waiting for the number to increase to the predetermined number or more and then permitting the execution of the predetermined procedure, in case that the number is less than the predetermined number;

execution means for executing the predetermined procedure when the execution permitting means permits the execution; and

recording area changing means for allowing recording on the first recording area to stop before the execution of the predetermined procedure and allowing recording on the second recording area to start after the execution of the procedure.

3. The digital recording apparatus of Claim 2,  
wherein the digital recording apparatus records the  
digital stream as one object or partitions the digital stream  
into a plurality of objects and records the partitioned objects,  
each of the objects is recorded on a continuous recording  
area on the digital recording medium, the continuous recording  
area is not necessarily continuous with the other recording  
areas.

the obtaining means obtains an instruction for a predetermined procedure in which an object has to be partitioned concurrently with the execution of the procedure, and the recording area changing means for allowing a first object being recorded in the first recording area to be completed before the execution of the predetermined procedure

15 and allowing a second object to be recorded on the second  
16 recording area after the execution of the predetermined  
17 procedure.

1 4. The digital recording apparatus of Claim 3,  
2 wherein a video resolution is specified for each frame,  
3 all frames included in one object must be a same video  
4 resolution, and  
5 the instruction includes an instruction that a video  
6 resolution of a frame is changed from a first video resolution  
7 to a second video resolution during recording,  
8 wherein the digital recording apparatus further  
9 includes:  
10 video resolution recording means for  
11 (1) recording information on the first video resolution  
12 that is specified for all frames included in the first  
13 object before the execution of the predetermined  
14 procedure, and  
15 (2) recording information on the second video resolution  
16 that is specified for all frames included in the  
17 second object after the execution of the procedure.

1 5. The digital recording apparatus of Claim 4,  
2 wherein it takes a certain amount of time for a  
3 reproduction head of a reproduction apparatus to seek an object  
4 from another object, when the two objects are continuously  
5 reproduced using the reproduction apparatus and are not

6 continuous with each other on the digital recording medium, and  
 7 the predetermined number specified by the execution  
 8 control means is not less than a number that is necessary for  
 9 realizing a seamless reproduction without being influenced by  
 10 the expected maximum seeking time.

1 6. The digital recording apparatus of Claim 5,  
 2 wherein the digital recording medium is a writable  
 3 DVD-disk,  
 4 the digital recording apparatus is a DVD recording  
 5 apparatus that records a digital video stream on the writable  
 6 DVD-disk, and  
 7 the object is a VOB conforming to the DVD-VideoRecording  
 8 standard.

1 7. The digital recording apparatus of Claim 4 further  
 2 comprising:  
 3 resolution decision means for  
 4 (1)detecting a value of a high frequency component of the  
 5 frame,  
 6 (2)deciding a video resolution in accordance with the  
 7 value, and  
 8 (3)in case that the video resolution should be changed,  
 9 giving the obtaining means an instruction to change  
 10 the video resolution as the instruction;  
 11 wherein the execution means changes a video resolution  
 12 to the video resolution decided by the resolution decision means,

13 when the execution permitting means permits the execution of  
14 the procedure.

1 8. The digital recording apparatus of Claim 3,  
2 wherein the obtaining means includes:  
3 receiving means for receiving an instruction for a  
4 procedure during recording; and  
5 discrimination means for discriminating whether the  
6 instruction received by the receiving means is an instruction  
7 for the predetermined procedure or an instruction for the other  
8 procedures,

9 wherein recording times of all frames included in a same  
10 object are continuous,  
11 the predetermined procedure includes a recording pause,  
12 and

13 the other procedures include cancellation of the  
14 recording pause,

15 wherein, when the discrimination means recognizes that  
16 the receiving means has received the instruction for the  
17 recording pause, the execution permitting means

18 (1) immediately permits the execution of the recording  
19 pause, in case that the number of frames included  
20 in the first object is the predetermined number or  
21 more, and

22 (2) waits for the number to increase to the predetermined  
23 number or more and then permits the execution of the  
24 recording pause, in case that the number is less than

2025 RELEASE UNDER E.O. 14176

the predetermined number,  
the execution means  
(1) allows recording to pause and makes the apparatus  
a standby mode, when the execution permitting means  
permits the execution of the recording pause, and  
(2) allows recording to be resumed, when the  
discrimination means recognizes that the receiving  
means has received the instruction for the  
cancellation of the recording pause during the  
standby mode, and  
the recording area changing means allows the first object  
being recorded on the first recording area to be completed  
before the execution of the recording pause by the execution  
means and allows the second object to be recorded on the second  
recording area after the execution means allows the resumption  
of recording.

9. The digital recording apparatus of Claim 8,  
wherein it takes a certain amount of time for a  
reproduction head of a reproduction apparatus to seek an object  
from another object, when the two objects are continuously  
reproduced using the reproduction apparatus and are not  
continuous with each other on the digital recording medium, and  
the predetermined number specified by the execution  
control means is not less than a number that is necessary for  
realizing a seamless reproduction without being influenced by  
the expected maximum seeking time.

1 10. The digital recording apparatus of Claim 9,  
2 wherein the digital recording medium is a writable  
3 DVD-disk,  
4 the digital recording apparatus is a DVD recording  
5 apparatus that records a digital video stream on the writable  
6 DVD-disk, and  
7 the object is a VOB conforming to the DVD-VideoRecording  
8 standard.

1 11. A digital recording program that has a computer obtain  
2 a digital stream including of a plurality of frames, while  
3 recording the digital stream on a digital recording medium,  
4 the program having the computer conduct the steps of:  
5 (a) an obtaining step for obtaining, during a recording,  
6 an instruction to perform a predetermined procedure  
7 in which a recording area for the recording is  
8 changed from a first recording area to a second  
9 recording area which is not necessarily continuous  
10 to the first recording area; and  
11 (b) an execution control step for, in case that the  
12 instruction is obtained in the obtaining step and  
13 when the number of frames which are recorded in the  
14 first recording area is a predetermined number or  
15 more,  
16 (1) executing the predetermined procedure, and  
17 (2) allowing the recording area to be changed from

18 the first recording area to the second recording  
19 area after the execution of the procedure.

1 12. The digital recording program of Claim 11,  
2 wherein the execution control step includes the sub steps  
3 of:

4 an execution permitting sub step for, when the obtaining  
5 step obtains the instruction,

6 (1) immediately permitting the execution of the  
7 predetermined procedure, in case that the number of  
8 frames which are recorded in the first recording area  
9 is the predetermined number or more, and

10 (2) waiting for the number to increase to the  
11 predetermined number or more and then permitting the  
12 execution of the predetermined procedure, in case  
13 that the number is less than the predetermined  
14 number;

15 an execution sub step for executing the predetermined  
16 procedure when the execution permitting sub step permits the  
17 execution; and

18 a recording area changing sub step for allowing recording  
19 on the first recording area to stop before the execution of the  
20 predetermined procedure and allowing recording on the second  
21 recording area to start after the execution of the procedure.

1 13. The digital recording program of Claim 12,  
2 wherein the digital recording program has the computer



3 record the digital stream as one object or partition the digital  
4 stream into a plurality of objects and record the partitioned  
5 objects,

6 each of the objects is recorded on a continuous recording  
7 area on the digital recording medium, the continuous recording  
8 area is not necessarily continuous with the other recording  
9 areas,

10 the obtaining step obtains an instruction for a  
11 predetermined procedure in which an object is partitioned  
12 concurrently with the execution of the procedure, and

13 the recording area changing sub step for allowing a first  
14 object being recorded in the first recording area to be  
15 completed before the execution of the predetermined procedure  
16 and allowing a second object to be recorded on the second  
17 recording area after the execution of the predetermined  
18 procedure.

1 14. The digital recording program of Claim 13,  
2 wherein a video resolution is specified for each frame,  
3 all frames included in one object must be a same video  
4 resolution, and

5 the instruction includes an instruction that a video  
6 resolution of a frame is changed from a first video resolution  
7 to a second video resolution during recording,

8 wherein the digital recording program has the computer  
9 conduct the further step of:

10 a video resolution recording step for

11 (1) recording information on the first video resolution  
12 that is specified for all frames included in the first  
13 object before the execution of the predetermined  
14 procedure, and  
15 (2) recording information on the second video resolution  
16 that is specified for all frames included in the  
17 second object after the execution of the procedure.

1 15. The digital recording program of Claim 14 and having the  
2 computer conduct the further step of: ,  
3 a resolution decision step for  
4 (1) detecting a value of a high frequency component of the  
5 frame,  
6 (2) deciding a video resolution in accordance with the  
7 value, and  
8 (3) in case that the video resolution should be changed,  
9 giving an instruction to change the video resolution  
10 in the obtaining step as the instruction;  
11 wherein, in the execution sub step, a video resolution  
12 is changed to the video resolution decided in the resolution  
13 decision step, when the execution of the procedure is permitted  
14 in the execution permitting sub step.

1 16. A digital recording method for obtaining a digital stream  
2 consisting of a plurality of frames, while recording the digital  
3 stream on a digital recording medium,  
4 the digital recording method comprising the steps of:

- 5 (a) an obtaining step for obtaining, during a recording,  
6 an instruction to perform a predetermined procedure  
7 in which a recording area for the recording is  
8 changed from a first recording area to a second  
9 recording area which is not necessarily continuous  
10 to the first recording area; and  
11 (b) an execution control step for, in case that the  
12 instruction is obtained in the obtaining step and  
13 when the number of frames which are recorded in the  
14 first recording area is a predetermined number or  
15 more,  
16 (1) executing the predetermined procedure, and  
17 (2) allowing the recording area to be changed from  
18 the first recording area to the second recording  
19 area after the execution of the procedure.

- 1 17. The digital recording method of Claim 16,  
2 wherein the execution control step includes the sub steps  
3 of:  
4 an execution permitting sub step for, when the obtaining  
5 step obtains the instruction,  
6 (1) immediately permitting the execution of the  
7 predetermined procedure, in case that the number of  
8 frames which are recorded in the first recording area  
9 is the predetermined number or more, and  
10 (2) waiting for the number to increase to the  
11 predetermined number or more and then permitting the

12 execution of the predetermined procedure, in case  
13 that the number is less than the predetermined  
14 number;  
15 an execution sub step for executing the predetermined  
16 procedure when the execution permitting sub step permits the  
17 execution; and  
18 a recording area changing sub step for allowing recording  
19 on the first recording area to stop before the execution of the  
20 predetermined procedure and allowing recording on the second  
21 recording area to start after the execution of the procedure.

1 18. The digital recording method of Claim 17,  
2 wherein the digital stream is recorded as one object or  
3 the digital stream is partitioned into a plurality of objects  
4 and the partitioned objects are recorded,  
5 each of the objects is recorded on a continuous recording  
6 area on the digital recording medium, the continuous recording  
7 area is not necessarily continuous with the other recording  
8 areas,  
9 the obtaining step obtains an instruction for a  
10 predetermined procedure in which an object is partitioned  
11 concurrently with the execution of the procedure, and  
12 the recording area changing sub step for allowing a first  
13 object being recorded in the first recording area to be  
14 completed before the execution of the predetermined procedure  
15 and allowing a second object to be recorded on the second

16 recording area after the execution of the predetermined  
17 procedure.

1 19. The digital recording method of Claim 18,  
2 wherein a video resolution is specified for each frame,  
3 all frames included in one object must be a same video  
4 resolution, and  
5 the instruction includes an instruction that a video  
6 resolution of a frame is changed from a first video resolution  
7 to a second video resolution during recording,  
8 wherein the digital recording method further includes the  
9 step of:  
10 a video resolution recording step for  
11 (1) recording information on the first video resolution  
12 that is specified for all frames included in the first  
13 object before the execution of the predetermined  
14 procedure, and  
15 (2) recording information on the second video resolution  
16 that is specified for all frames included in the  
17 second object after the execution of the procedure.

1 20. The digital recording method of Claim 19 and comprising  
2 the further step of:  
3 a resolution decision step for  
4 (1) detecting a value of a high frequency component of the  
5 frame,  
6 (2) deciding a video resolution in accordance with the

7 value, and  
8 (3) in case that the video resolution should be changed,  
9 giving an instruction to change the video resolution  
10 in the obtaining step as the instruction;  
11 wherein, in the execution sub step, a video resolution  
12 is changed to the video resolution decided in the resolution  
13 decision step, when the execution of the procedure is permitted  
14 in the execution permitting sub step.